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(54) PROCESS AND APPARATUS FOR MAKING A SMOKABLE COFFEE
PRODUCT

(72) Bustamante, Carlos R.,
U.S.A.

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ABSTRACT OF THE DISCLOSURE

A process is provided herein for making a coffee product from whole coffee cherries. The process comprises the steps of: (a) applying a compressional force to the whole coffee cherries of sufficient magnitude to dehydrate the cherries to a selected degree; (b) comminuting the dehydrated cherries into particles; (c) roasting the particles to provide an intermediate brewable coffee product of enhanced shelf life; and (d) hydrating the intermediate brewable coffee product and subsequently evaporating same to provide a smokable coffee product. These steps provide a process by which whole coffee cherries may be treated selectively and in controllable time frames to produce either a beverage base or a smokable coffee product and in which the beverage base has a sufficiently indefinite shelf life to provide to the producer a valuable economic choice with regard to whether or not the end product shall be a beverage base or a smokable product thereby to provide him with a powerful economic tool in the world market.

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The present invention relates to a process for manufacturing a smokable coffee product from the whole coffee cherry.

Smoking, to many people, is a highly desirable personal habit or practice despite the mounting body of evidence that the smoking of tobacco in cigarette form in particular has many undesirable and potentially hazardous effects on the smoker.

Programs have been instituted in an attempt to produce less hazardous cigarettes by the treatment of tobacco and tobacco products to remove as many undesirable components and constituents therefrom as possible without destroying the flavour of the ultimate smokable product.

There appear to be certain key characteristics which consumers consider a requisite for acceptability of cigarette products. For example, if the cigarette does not have a fragrance which is generally tobacco-like or at least similar to the fragrance of burning tobacco, then the product is considered unacceptable. Also the character of the smoke must be other than that of a burning paper and more like wood smoke or the like and produce both moistness and fullness in the mouth of the consumer smoking the final product.

In addition to the foregoing, other efforts have been made to develop tobacco substitutes including, for example, the use of chemically treated coffee bean hulls and the like, which has been described, for example, in United States Patent No. 3,796,222 of Edward J. Deszyck entitled "Method of Making a Smoking Product From Coffee Bean Hulls" issued March 12, 1974. This patent discloses a number of relatively complex chemical treatments of coffee bean hulls in order to cause specific chemical reactions and extractions of the components of the coffee hulls to produce a smokable coffee product which is usable either alone or as disclosed in the patent, preferably in a mixture with natural tobacco.

However, in the patent just identified, as well as in other

smoking products, expensive chemical reagents, e.g., humectants are all considered to be a required component of the ultimate product and accordingly, greatly increase the cost of the product.

Accordingly, it is an object of a broad aspect of the present invention to provide a novel apparatus and process for making a smokable coffee product from the whole coffee cherry.

It is an object of a further aspect of the present invention to provide an apparatus and process for economically and efficiently making a smokable coffee product from the whole coffee cherry in which
10 the smokable coffee products may be stored in an intermediate product form or in a final finished smokable product form.

Since the discovery of the coffee cherry, beverages have been made from the whole cherry or selected portions thereof. See All About Coffee, W. H. Ukers, p. 11, Second Edition 1935, Published by The Tea and Coffee Trade Journal Company. The conventional coffee beverage, as we know it today, is made from the roasted coffee bean after it has been removed from the surrounding pulp, cod and parchment and suitably dried and roasted.

In the early days coffee beverages were also made from the pulp
20 and cod surrounding the bean or the whole coffee cherry including the bean and the surrounding chaff. However, it was discovered that the pulp surrounding the bean, i.e., the pulp between the chaff and the outer shell or cod, tends to ferment if allowed to stand. Thus, these earlier beverages were in the nature of intoxicating wine-like liquors. Therefore, in order to manufacture the conventional non-intoxicating coffee beverage known to us today, the cod and pulp (which tends to ferment) and the parchment have traditionally been removed before grinding and roasting the bean.

Applicant has previously discovered that fermentation of the
30 pulp surrounding the coffee bean between the parchment and the cod can

be precluded by partially dehydrating the entire coffee cherry, promptly grinding the entire cherry into particles, and promptly roasting or processing the particles in a conventional manner to form a coffee product.

The dehydration of the whole coffee cherry is preferably performed by a mechanical type press of any suitable design. The coffee cherries are subjected to a compressional force in the press which dehydrates the coffee cherries to a selected degree and forms the cherries into blocks or pellets.

10 The blocks or pellets are then immediately introduced into a grinder to disintegrate the cherries into particles.

The particles are then immediately roasted or processed in a conventional manner.

The process described above is an integrated process in which the steps are carried out in succession without any significant dwell periods between steps. In this way the coffee cherries are precluded from fermenting because of the combined effect of the successive steps of the integrated process.

20 The compressional force may be varied to produce unexpected results in the final product. The compressional force is selected to be sufficient to squeeze out at least enough of the natural juices to inhibit rapid fermentation of the coffee cherry. However, the magnitude of the compressional force may be varied selectively to control the flavour of the resulting coffee beverage. It is believed that this flavour control is effected, since the flavour of the final product is related to the quantities of water-soluble materials in the aqueous phase of the whole coffee cherry. By varying the compressional force more or less of the aqueous phase is removed from the coffee cherry. Thus, the quantities of water-soluble substances in the final product can be selectively controlled by selectively varying the magnitude of the compressional force.

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For example, the pulp of the whole coffee cherry is known to contain carbohydrates, salts and proteins dissolved in the aqueous phase. All of these may have an effect on the final flavour of the coffee beverage. Thus, if these substances can be extracted in controlled amounts, the flavour of the final product will be controlled.

It is believed that the water-soluble carbohydrates in the aqueous phase have a marked effect on the flavour of the final product because the carbohydrates are major contributors to any caramelization that occurs during roasting. It would appear that any caramelization occurring during roasting tends to trap or contain flavour and aroma-producing oils within the particles which might otherwise evaporate during roasting. Accordingly, the degree of caramelization dependent on the quantity of water-soluble carbohydrates can be controlled by the selected compressional force on the whole coffee cherry.

The aqueous phase also contains water-soluble inorganic salts consisting primarily of potassium, calcium, phosphorous, and magnesium. The quantities of these salts in the final coffee product can be controlled by the magnitude of the compressional force.

In a like manner, the quantity of soluble proteins in the final product may be controlled.

As is well known in conventional coffee utilizing only the coffee bean, the flavour and aroma are controlled by the oils within the green bean. By varying the compressional force in the process described above the resulting shearing forces on the green bean are varied. Thus, the quantity of oil or oils extracted is selectively controlled selectively to control the flavour of the final coffee product.

The process described above also provides an increased yield and a low caffeine content. With respect to the increased yield, it is generally known that five hundred (500) pounds of whole coffee cherries include approximately one hundred (100) pounds of green coffee beans.

Therefore, the parchment, pulp and cod comprise approximately 80% by weight (400) pounds of the whole coffee cherry. Of this 400 pounds 80% or 320 pounds is water and 20% or 80 lbs. is usable coffee. Thus, from the 400 lbs. the process described above utilizes 180 lbs. of the solids of the coffee cherry, giving an 80% increase in yield prior to roasting. After roasting, approximately 120 to 160 lbs. of roasted coffee will result from the original 500 lbs. of whole coffee cherries.

10 With respect to the reduced caffeine content of the coffee product provided by the above-described process, as much as 56% of the caffeine may be removed. The caffeine content of a whole coffee cherry is known to be 11.49 mg per gram. The caffeine content of the resulting coffee product may be as low as 5.13 mg per gram.

It has also been discovered that the coffee product has an increased shelf life and may in fact be stored unpressurized for periods of years without any significant detrimental effect on flavour. It is believed that this prolonged shelf life may be due to the soluble carbohydrates in the pulp of the cherry which caramelize during roasting.

20 Thus, as disclosed above, applicant had previously discovered that fermentation of the pulp surrounding the coffee bean between the parchment and the cod can be precluded by partially dehydrating the entire coffee cherry, promptly grinding the entire cherry into particles, and promptly roasting or processing the particles in a conventional manner to form a coffee product.

At this stage of the process, the formed coffee product is in primarily a brewable form from which to produce a beverage.

30 In order to render the beverage style intermediate product more smokable, it has now been discovered that a further step is essential in order to give the intermediate product characteristics which produce a more desirable smokable product to enhance flavour, burning qualities, and aroma.

Simply stated, the additional treatment of the intermediate coffee product formed from the whole coffee cherry as above described is provided by hydrating the intermediate product and subsequently evaporating the moisture from the product.

By one broad aspect of this invention, a process is provided for making a coffee product from whole coffee cherries comprising the steps of: (a) applying a compressional force to the whole coffee cherries of sufficient magnitude to dehydrate the cherries to a selected degree; (b) comminuting the dehydrated cherries into particles; (c) 10 roasting the particles to provide an intermediate brewable coffee product of enhanced shelf life; and (d) hydrating the intermediate brewable coffee product and subsequently evaporating same to provide a smokable coffee product.

By another aspect of this invention, a process is provided for making a coffee product from whole coffee cherries comprising the steps of: (a) breaking the whole coffee cherries up into particles; (b) dehydrating the particles to a selected degree; (c) comminuting the dehydrated particles into finer particles; (d) roasting the particles to produce an intermediate brewable coffee product of enhanced shelf life; 20 (e) hydrating the intermediate product; and (f) evaporating the water of hydration and other volatile constituents from the coffee product to produce a smokable coffee product.

The smokable coffee product prepared as above is also an aspect of this invention. After the moisture

After the moisture has been evaporated from the product, the dried end product is in the form of granules or shredable sheets which may be placed into cigarettes, pipes, or other smoking paraphernalia and smoked as a pure smoking product or, if desired, mixed with tobacco in any desired proportions.

30 There is no need, however, to admix the smokable coffee product

of an aspect of the present invention with tobacco since it is a smokable product with all of the desirable characteristics of fullness of flavour, a sense of moist flavour in the mouth, and desirable aroma and character in the smoke produced therefrom.

The dehydration of the whole coffee cherry in a preferred embodiment is performed by a mechanical type press of any suitable design. The coffee cherries are subjected to a compressional force in the press which dehydrates the coffee cherries to a selected degree and forms the cherries into blocks or pellets.

10 The blocks or pellets are then immediately introduced into a grinder to disintegrate them into particles.

The particles are then immediately roasted or processed in a conventional manner. The process of an aspect of the present invention to this point is an integrated process in which steps are carried out in succession without any significant periods between steps. In this way, the coffee cherries are precluded from fermenting because of the combined effect of the successive steps of the integrated process over the time frame in which they are performed.

20 Therefore, at this point in time, an intermediate roasted product has been produced which, if desired, can be brewed into a beverage and which has an enhanced shelf life in that form.

Because of the process described above, the intermediate product can be produced rapidly and economically in the country of origin of the coffee cherries and then shipped in the intermediate product form for end use throughout the world either as a beverage or as a smokable coffee product.

30 When it is desired further to process the intermediate coffee product into a smokable coffee product, then the intermediate product is hydrated, e.g. as by mixing the product with water in a suitable blender, for example, proportions of fifty percent water and fifty percent coffee

product by volume, and then permitting the hydrated slurry to dry by evaporating the water therefrom on a drying surface. The resulting product is preferably broken up into granules of a desired size and consistency from the dried state at which point in time the product is fully smokable either in its pure form or as a mixer with conventional tobacco and the like.

As previously disclosed hereinabove, the pulp of the whole coffee cherry is known to contain carbohydrates, salts and proteins dissolved in the aqueous phase. All of these may have effect on the final characteristics of the intermediate product. Thus, in the intermediate product prior to the hydration and evaporation steps forming an essential part of the process of an aspect of the present invention, there are present water-soluble carbohydrates which have been caramelized during roasting to provide a coating around each roasted particle since the roasting has taken place with those natural juices of the whole coffee cherry remaining after the pressing and comminution. Consequently, the natural flavours and aromas are trapped within each particle by these coatings. Accordingly, by hydrating the roasted particles constituting the intermediate product, these coatings are apparently dissolved and upon evaporation certain volatile constituents of the intermediate product are apparently removed, thereby providing the smokable coffee product with unique qualities of smell, taste and texture which render it desirable as a smokable coffee product.

Since the intermediate coffee product described above has an increased shelf life and may in fact be stored unpressurized for long periods without any significant detrimental effect on the flavour, it is noted that the present invention in its various aspects permits the coffee product to remain in this form over a period of one or more years such that depending upon the conditions of the world market, persons may select whether to make use of the intermediate product as a beverage or

to process it further into a smokable product. This gives coffee producing nations more economic flexibility with regard to the end use of their product than ever before thought to be possible.

In the accompanying drawings,

Figure 1 is a cross section of a whole coffee cherry; and

Figure 2 is a diagrammatic view of a preferred embodiment of the processing machinery used in the process of an aspect of the present invention.

Referring in detail to Figure 1, there is illustrated a whole
10 coffee cherry generally designated 10. The cherry consists of inner beans 12, covered by an inner shell or chaff 14, parchment 15 surrounding the chaff, a layer of mucilage 19 surrounding the parchment, pulp 16 contiguous to the mucilage and an outer shell or cod 18.

As stated hereinbefore in making conventional hot coffee beverages which are known today, the mucilage 19, pulp 16 and the outer shell or cod 18 are removed because of the tendency of each of the above constituents to spoil or ferment.

The process of an aspect of the present invention makes it possible to utilize the entire coffee cherry including the mucilage 19,
20 the parchment 15, the pulp 16 and cod 18 to produce a coffee product with controlled flavour and increased yield per cherry.

The process of an aspect of the present invention can best be understood by reference to Figure 2. As illustrated therein, a plurality or predetermined quantity of whole coffee cherries 10 are introduced at a first station into a mechanical press and pelletizer generally indicated at 20.

The press consists of a chamber 22 with inlet and outlet openings 22A, 22B, respectively. A hinged door 26 is provided over inlet opening 22A and a similar door 28 is provided over outlet opening 22B.
30 Each of the doors may be actuated between open and closed positions by

suitable hydraulic pistons 24B and 24C, respectively.

A compression piston head 25 is provided in one end of chamber 22 and is suitably coupled through the end wall of chamber 22 to hydraulic drive piston 24A.

The hydraulic pistons 24A, 24B, 24C are operated in synchronism to compress the coffee cherries and thus to dehydrate and pelletize the same in the following manner. With piston head 25 in the position shown, piston 24B is actuated to open door 26 and thus permit the introduction of a predetermined quantity of cherries 10 through opening 22A into chamber 22. At this time door 28 is closed. Door 26 is then closed by deactivating piston 24B and piston 24A is actuated to drive piston head 25 to the left. Piston head 25 pushes against the cherries 10 and compresses the same thus, forming a pellet or block 30 of unbroken whole coffee cherries. The piston head 25 is then retracted permitting the block 30 to drop to the next processing station through door 28, which is opened in synchronism with retraction of piston 25.

For reasons stated hereinbefore by varying the compressional force generated by piston 25, the flavour of the resulting coffee product can be controlled. For example, if a pressure of X psi is applied to hydraulic cylinder 24A, a strong flavoured coffee may result. However, if a pressure of Y psi is applied, a more mellow flavour might result. This change in flavour, as stated hereinbefore, is believed to be caused by the controlled removal of selected quantities of the oils and chemical substances in the aqueous phase within the whole coffee cherry.

Block or pellet 30 consists of dehydrated whole coffee cherries.

Suitable means may be provided in chamber 22 for receiving the liquid squeezed out of the coffee cherries in chamber 22.

The second processing station consists of a funnel-shaped cylindrical conveyor chute 31 and a grinder 32. The pellets 30 enter the open end of the conveyor 31 and drop into contact with grinder rotor 34

which disintegrates the dehydrated coffee cherries into small particles.

Grinder rotor 34 has protuberances 34A thereon for disintegrating the cherries and is driven via a belt and sprocket drive 38 by a motor 36.

The ground particles consisting of all the constituents of the whole coffee cherry are then fed to a third station where they are roasted by a roaster 40.

Roaster 40 may be of any conventional type and by way of example may include a screw conveyor 44 driven by a motor 45 and a gas heater 42 to provide for the progressive and continuous roasting of the ground coffee particles.

A conduit 46 is provided for feeding the roasted coffee to a packaging station 48. A final grinding station may be placed, if desired, between the conduit 46 and packaging station 48.

The intermediate coffee product ICP at the packaging station 48 may be maintained in its beverage producing form for relatively indefinite periods of time until such time as a decision is made by the producer to either market it as a beverage base or further to treat it and produce a smokable coffee product therefrom.

In order to produce the smokable coffee product from the intermediate coffee product ICP, the process of an aspect of the present invention requires only that the intermediate coffee product ICP be hydrated for example, fifty percent of the product ICP and fifty percent of water by volume is hydrated in a blender and after five minutes of agitation is permitted to evaporate by spreading it on an evaporating surface or the like. The resulting dried product is then broken up into particles of desirable size and placed either in a cigarette configuration or into the bowl of a conventional pipe. At this point, the resulting end product need only be ignited by an ordinary match or the like and smoked as if it were tobacco.

If desired, various proportions of the smokable coffee product of an aspect of the present invention may be mixed with natural tobacco to provide taste variations to suit a given smoker.

Accordingly, as can be seen from the foregoing specifications and drawings, the present invention in its main aspects has provided a new process by which whole coffee cherries may be treated selectively and in controllable time frames to produce either a beverage base or a smokable coffee product and in which the beverage base has a sufficiently indefinite shelf life to provide to the producer a valuable economic choice with regard to whether or not the end product shall be a beverage or a smokable product thereby to provide him with a powerful economic tool in the world market.

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The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A process for making a coffee product from whole coffee cherries comprising the steps of:

- (a) applying a compressional force to said whole coffee cherries of sufficient magnitude to dehydrate said cherries to a selected degree;
- (b) comminuting said dehydrated cherries into particles;
- (c) roasting said particles to provide an intermediate brewable coffee product of enhanced shelf life; and
- (d) hydrating said intermediate brewable coffee product and subsequently evaporating same to provide a smokable coffee product.

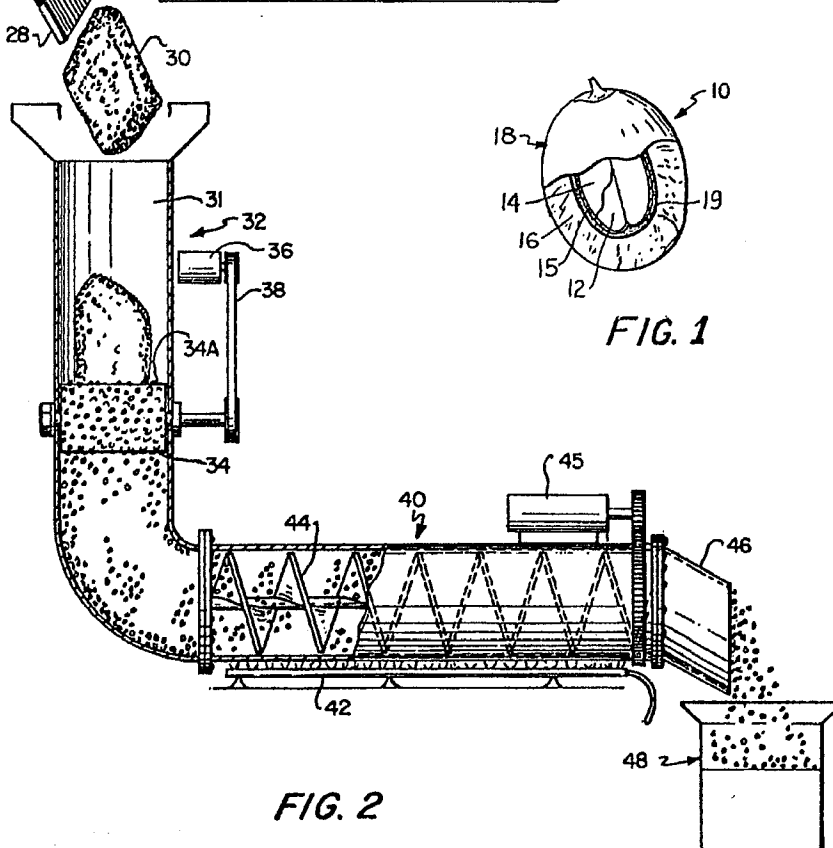
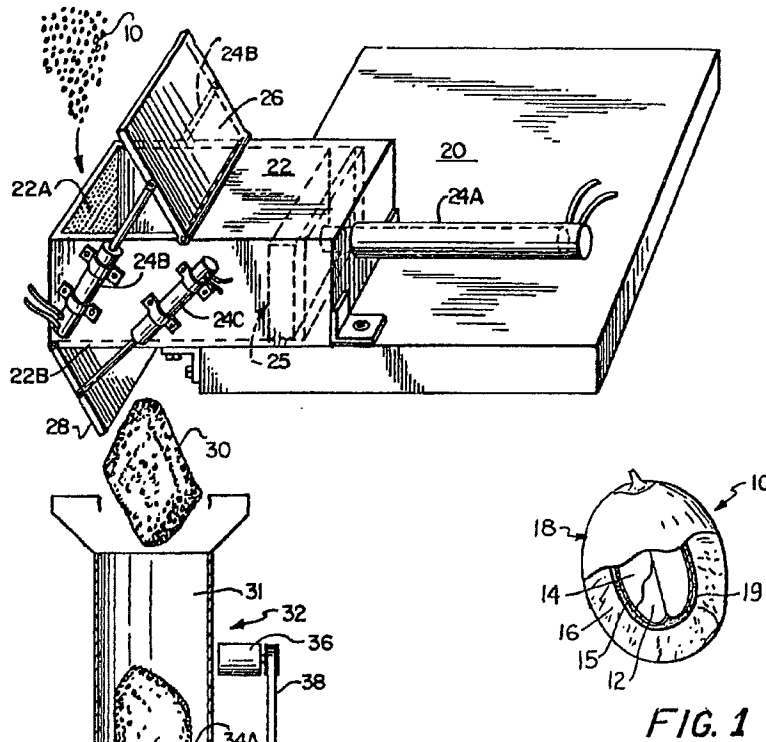
2. A process for making a coffee product from whole coffee cherries comprising the steps of:

- (a) breaking said whole coffee cherries up into particles;
- (b) dehydrating said particles to a selected degree;
- (c) comminuting said dehydrated particles into finer particles;
- (d) roasting said particles to produce an intermediate brewable coffee product of enhanced shelf life;
- (e) hydrating said intermediate product; and
- (f) evaporating the water of hydration and other volatile constituents from said coffee product to produce a smokable coffee product.

3. A smokable coffee product whenever prepared by the process of claim 1 or by its obvious equivalent.

4. A smokable coffee product whenever prepared by the process of claim 2 or by its obvious equivalent.





Carlos R. Bustamante
Inventor

Marcus & Associates

PATENT AGENTS

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